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**TV & VCR Rentals—Smarter than Buying?  
Terrific Titling Tips for Tapesters**

**The Incredible Space Mirror: Fact or Fiction?**

**BERGER-BRAITHWAITE VIDEOTESTS**

Marantz Beta VCR Zenith Component System RCA Color Camera JVC Compact VHS

## Which Home Computer Is Best for You?



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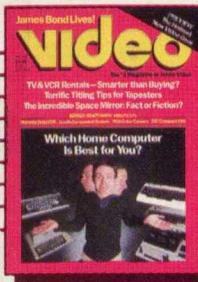


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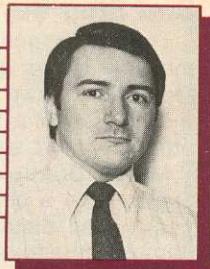




# The TV Den

Understanding Techniques and Technology

by Roderick Woodcock



## Titling Tips for Tapesters

Last month we discussed the technological side of new machines that offer "video dub" or "video insert" editing. New VCRs like the JVC HR-7650, HR-2650, Hitachi VT-6800, and most new Matsushita portables from companies like Canon, Nikon, Panasonic, and others all offer a variation of video dub. This month we'll discuss how to put the feature to work in your own productions.

As we explained last time, the biggest advantage of video insert is in adding titles to completed tapes. You can place titles at the beginning of a tape, at the end, or between segments. One problem you may have in adding any title, however, is finding a stretch of tape you can afford to erase and replace with the new segment. Leave several feet of blank tape (30 seconds or so) at the beginning of a cassette before you start recording. That extra length provides a cushion that you can fall back on if the tape leader becomes damaged. Plus, you can use the extra space to add a title.

Putting a title between other segments is more difficult since you must record over a small part of the original tape. Unless you're the Steven Spielberg of the video set, chances are your tapes aren't edited so tightly that you won't find some duller segment you can replace with a titled insert. Of course, if you tape ahead with the idea of adding titles later, all you need do is leave some space at the appropriate point. Capping the lens of your camera and recording some video "black" is a good way to remind yourself where you want to add the title later.

Now for the titles themselves: Let's start with the most elementary techniques. You've probably already experimented with shooting pieces of cardboard on which you have written a title in crayon or felt marker. Put your camera on a tripod, aim it at the card, adjust the zoom, focus, and shoot. Try to keep the horizontal and vertical

*The 'Type & Talk' cartridge for the Magnavox Odyssey 2 system can be used as a low-cost character generator.*

ODYSSEY TNT  
DR. AND MRS.  
MIDDLEMAN  
PRESENT  
ELYSES  
WEDDING DAYO

*A cartridge for Bally's Astrocade system can create more sophisticated colored lettering as well as other kinds of graphics.*

THE  
END

dimensions of the cardboard in the same four by three "aspect ratio" of your TV set. This technique is fast, easy, and cheap; unfortunately, it looks just that way too.

A better method is to use pressure-sensitive adhesive letters like Letraset and Prestype. They come in a variety of styles and sizes and are available in most stationery stores. The extra time and patience required to prepare the titles will pay off in a more professional look.

While good titles can be obtained just by using a tripod and carefully aiming your camera at the title card, pasted or clipped to a well-lighted wall, some companies like Sony make optional accessories designed to make even this simple chore easier. Sony's HVT-2100 Titler clips in front of the camera lens and provides a ready-made frame

into which you can slip title cards.

With a little ingenuity, you can create titles out of children's alphabet building blocks or Scrabble tiles. If your VCR features a clean-cut editing feature, you could even animate some of the titles you create. Put your camera on a tripod, lock it into position focused and aimed at the title "set," and shoot—adding one letter at a time while the VCR is in the pause mode and recording a few seconds of each letter after it is added to the display. The letters will appear to pop on the screen one by one, with only a slight amount of picture breakup, depending on how well your VCR's edit feature works.

You can resort to electronic titles as well. If you own one of the latest crop of Matsushita-made cameras like the Quasar VK-743, Zenith VC-1800, or equivalent you can generate titles right

in your camera using the built-in "character generator." This display (all capital letters) lets you create titles with five lines of information, 12 characters wide.

And if that's not enough, there are even video games on the market that can be used as low-cost character generators. The Magnavox Odyssey 2, for example, can take a "Type & Talk" cartridge and "Voice" module that let you paint white capital letters on a blue background in a title matrix 12 letters wide by 6 high. It's easy to record the RF output of the game console just by running it into the VHF input of your VCR, with the tuner set to Channel 3 or 4.

It's a good idea to use graph paper to plot out exactly where you want to place the words as they appear on the screen. "Type & Talk" also has a voice-synthesis feature that lets the game speak (in a garbled computer "voice") the words you spell out. Unfortunately the audio from the game comes out of the game's speaker rather than through the TV, so you can't record it on tape.

Other video games have titling potential as well. Bally's Astrocade comes with a built-in "scribbling" program that lets you create a variety of multicolored images on your TV screen. With a little practice it's not difficult to create a variety of short titles that can also be recorded on videotape. A more elaborate Astrocade cartridge, "Creative Crayon," goes one better. It gives you two sets of letter "fonts" (upper and lower case) and an electronic "light pen" to let you draw electronic graphics of all shapes, sizes, and colors (as many as 256!) right on your TV screen, transferring them to videotape (or audio-cassette tape if you want to save them using the game itself) for later inclusion into your award-winning production.

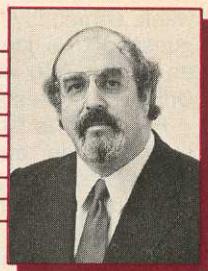
If you own any video game, you might want to take a closer look at it to discover if it has some "hidden" feature you can exploit for postproduction. For example, one of the nice touches on professionally made tapes is "silent black" at the end of a program. Instead of a TV screen filled with the usual video noise and snow, you see a completely black screen. With the ColecoVision system it's easy to create a good video-black equivalent. A few seconds after a game is played, the console automatically kills the color display and generates a totally black image. You can record that non-picture and use it to fill in the tail end of your own tapes, or to generate a clean leader at the start of others.

So there. Whether you combine these hints and tips with insert editing on newer VCRs or use them as you shoot, a few simple titling tricks will make your tapes look much more professional in the end. And in the beginning, too. 

# Computer Ease

The Human Interface

by Ivan Berger



## Graphics — What to Expect and Why

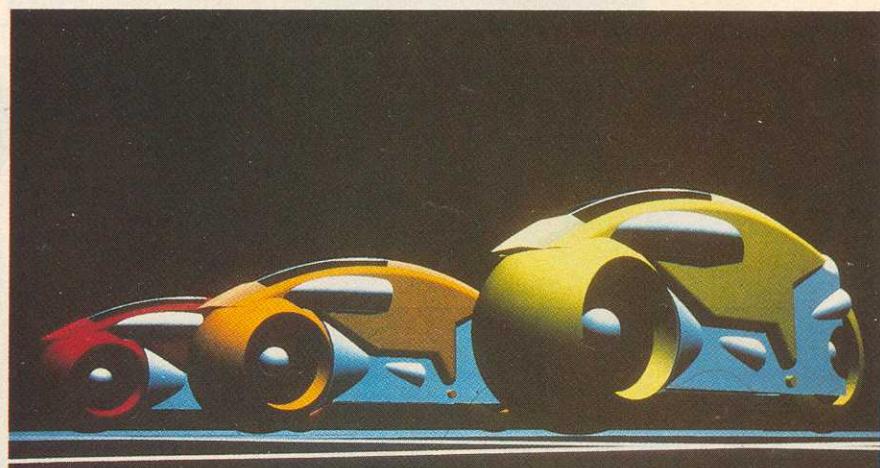
If computers use video screens, why can't they make TV-like images for those screens? Well, they can—but the images are not as "TV-like" as one might hope.

Consider what goes into a TV picture. Of the 525 lines broadcast in each TV frame, about 350 are visible on-screen. Each line is made up of up to 350 dot-like elements (confusingly also called "lines" in "video resolution" figures). Each element can vary in brightness over a range of up to 10 steps for each of the three colors in a color picture. What you have on your TV screen, then, is theoretically as many as 3.7 million bits of information (350 lines times 350 elements times 10 shades times 3 colors). A typical home computer will have enough memory to hold between 48K and 64K bytes of information, or 393 to 524 thousand bits (one "K" is not 1000 but 1024—two to the tenth power).

In other words, there's nearly seven times as much information on a TV screen as you'll find in a home computer's memory. Pictures made on a home computer have to be less than TV quality. Corners must be cut.

One way to cut them is to reduce the number of picture elements or "pixels." Instead of TV's 122,500 pixels (350 lines of 350 elements), we'll settle for a smaller number. For example, the Atari can reproduce 320 by 192 pixels; the Apple II can handle 280 by 192; Radio Shack's Color Computer and Texas Instrument's 99/4A have 256 by 192; the Commodore VIC-20 has 320 by 200; and the IBM PC can handle 640 by 200 with its color board, and 750 by 350 with black-and-white display. Older designs and those intended primarily for business use have still fewer picture elements. The Radio Shack Model III normally has resolution of 128 by 48 pixels, though adapters can be added to raise that figure (to 640 by 240, in the case of Radio Shack's own adapter;

Simple patterns and primary colors dominate home-computer graphics, as in 'Sea Dragon' (right). Home computers haven't the memory capacity to create the more subtle colors and shadings that go into professional animation, like the sample below from the Disney film 'Tron.'



those made by others are similar).

The figures for the color computers tend to be misleadingly high. Since the amount of information they can hold for display is limited, most computers give you a choice of ways to use it: you can use all that information space to hold the maximum number of pixels, or you can use fewer pixels and put color and shading information in the remaining space. The TRS-80 Color Computer, for example, can be programmed for 256 by 192 pixels in two colors, 128 by 96 in four colors, or 64 by 48 in eight colors.

Those limits are why computer graphics tend to be boxy and their colors tend to be flashy primaries more than subtle pastels. But even such

graphics are enough to keep home-computer users entranced—at least till something better comes along. With today's graphics, you can make maps, pictures, abstract patterns, business charts and graphs, and play lovely games—in short, any application where the image can be simple or abstract.

There is a way to get true TV-quality graphics (or better) from computers, as in animation in the movie *Tron*. But they involve two other tradeoffs: cost and time.

The animation in *Tron* required far more computer power than any home computer offers. The Perkin-Elmer 3240 computer used had two megabytes (that's two million bytes) of built-

in memory and two 80-megabyte disk drives. It also had a faster, more powerful processor. That's too much computer power for a home computerist to even envy. This computer and the custom programming involved cost big, big money.

The 3240 enabled Disney to get pictures with a definition of two million pixels—the equivalent of a TV screen with 1800 lines and more than 1100 elements per line. But even that wasn't enough to get the pictures on screen in "real time"—that is, at the 24 frames per second required for filming. Instead, each frame—76,320 of them for the film's 53 minutes of animation—had to be created and photographed individually.

The graphics resolution of home computers is likely to increase over the next few years as larger memory chips and more powerful and faster processors become less expensive. But the pictures you can create on your screen will rise only to the level of the best arcade video games, not to the level of live TV pictures, at least in the near future.

That doesn't mean you won't be able to get computer games and other programs with TV-quality information. The trick will be to create all required images on a big computer, store them on a videodisc, and interface a player with random-access capabilities to your home computer. Such players and interfaces are already made for institutional audiovisual uses and Pioneer has introduced a prototype of a home model in Japan. Once we get such players, there will probably be a further lag while software makers learn how to exploit them.

There's also some prospect of videodisc recorders (not just players) a few years down the pike. These would open the way to creating TV-quality graphics on a home computer (not the one you have now, but one of the more powerful units to come) at whatever speed your computer can handle—and storing them on disc, frame by frame, as they're created.

Even with this setup, a do-it-yourself *Tron* would be no picnic. Assuming your computer could create a frame every hour, and that you used it for nothing else till your movie was done, it could create at most one second's worth of "footage" every 24-hour day, a minute's worth every 60 days, or a bit over 6 minutes' worth per year.

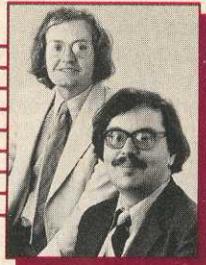
In the near term, however, you might see *Tron*-type effects used to bring full animation back to movie and TV screens. The old Warner and Disney 'toons had a visual inventiveness, a free play of visual fantasy that the newer limited-animation *Flintstones* and *Jetsons* and such lack. Shucks, I might even start waking up early on Saturdays for a return of that.



# Arcade Alley

A Critical Look at Video Games

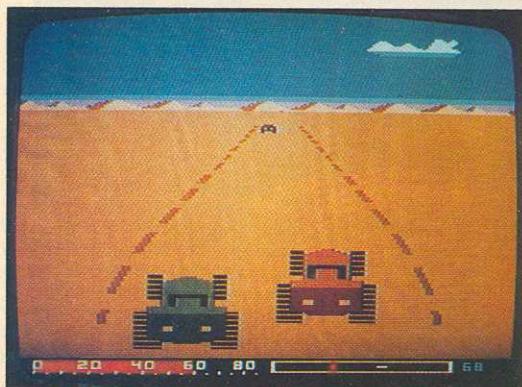
by Bill Kunkel & Arnie Katz



## Zapping for Truth and Justice



Innovative audiovisuals and play-action make 'Astro Chase' a distinguished shootout.



Somehow, 16K of memory manages to contain the ribboned road and scrolling mountains and clouds of 'Baja Buggies.'

The residents of "Arcade Alley" love those oh-so-charming "cute" games, with their eye-popping graphics, as much as anybody. But sometimes it's fun to put the more delicate contests aside, roll up your sleeves, hook up that gourmet joystick with the top-mounted action button, and wreak devastation among the evildoers.

There's something intensely satisfying about scouring the universe clean of malevolent monsters, aliens, and nasties. These shoot-'em-ups are a socially acceptable way to exorcise the violent impulses buried deep (maybe not so deep) within us all. Zapping everything that moves is, after all, OK when done in the name of justice.

This month we'll examine several cartridges for the Atari 2600 video-game system and a couple of contests for the Atari 400/800/1200XL computers. They have one element in common: they provide relentless action from the opening shot to the moment when the last defender gives up the ghosts. Some, like "Baja Buggies," also boast state-of-the-art audiovisuals, but the play-mechanic is the main attraction. Let's start with a few cartridges de-

signed for Atari 2600 (VCS) and the Sears Tele-Arcade.

**Vanguard** (Atari/Atari 2600) is a scrolling shootout and a marvelous home-arcade translation of a machine that sucked up quarters like a vacuum cleaner for Centuri in commercial fun palaces during 1981 and '82. Atari hasn't always done a good job on licensed titles, but this one is entirely worthy of the play-for-pay device that inspired it. The anonymous Atari designer made elegant simplifications in the graphics to create a cartridge that conjures memories of the more complex arcade version. This looks like "Vanguard," something that can't always be said of coin-op translations for this popular system.

Even more important, it has the same breathtaking action that longtime fans of "Vanguard" affectionately recall. The aracer wields the joystick to steer a heavily armed craft through a succession of scenarios which culminate in a showdown with the alien mastermind Gond. On the way, your ship must use a combination of firepower and deft helmsmanship to get through the Mountain, Rainbow, Stick, Striped, and

Bleak zones in one piece. The front cannon of the good ship Vanguard fires automatically. Quadirectional firing is also possible by flicking the joystick in the desired direction. And if you swoop down on the energy pods in the Mountain zone, the ship will briefly become energized and can destroy enemies by ramming them.

This is the first cartridge with a "continued play" option. After the gamer loses the final incarnation of the ship, a message appears on the screen asking whether the aracer wishes a re-start or would prefer to begin again with fresh supplies from the point at which the round ended.

Then there's **Robot Commando Raid** (U.S. Games/Atari 2600). All is quiet as day breaks over the war-torn village, but it isn't long before the sound of approaching helicopters fills the air. Soon, enemy whirlybirds begin crossing the screen, dropping android soldiers by parachute. The aracer commands an anti-aircraft battery located at the center bottom of the screen. Using the joystick to aim the barrel and the action button to fire, the player must attempt to shoot down the helicopters, robot troops, and occasional heavy bomber as waves of attackers assault the town.

When a robot warrior lands, he will usually destroy a portion of one of the buildings in the little town. If a paratrooper comes to earth on top of a completely ruined structure or on open terrain, he will begin excavating a tunnel to undermine the gun. Sooner or later, the robot army will successfully burrow its way beneath your mighty weapon and put it out of commission. The trick is to see how long you can battle against overwhelming odds. Once things really get rolling, the pace of the battle is just incredible—ample proof that even electronic war can be hell.

**Ram It** (Telesys/Atari 2600) comes from a publisher best known until now for games that add the spice of humor to the action, like "Cosmic Creeps" and "Communist Mutants." Graphics are attractive and serviceable, but "humorous" is hardly the right word.

Players use the stick to move the duodirectional shooter vertically along a line that bisects the playfield. Both edges of the display are lined with small blocks, each a different color, stacked one above the next with a small space

separating each bar from the ones immediately above and below it.

Every bar starts growing toward the center of the playfield at the start of the game. The only way to chop a bar down to size is by blasting it using the shooter. If the gamer whittles a bar down section by section until it vanishes, that bar is then inoperative. On the other hand, if two parallel bars meet in the middle, the shooter can no longer move past the point of intersection. In some variations it is possible to blast an entire block out of existence with one shot, but this doesn't make "Ram It" any more sedate.

The longer the game continues, the faster the colored bars grow. Once "Ram It" works up a good head of steam, there are few one-player games that provide such continuous excitement.

**Baja Buggies** (Gamestar/Atari computer systems/16K/disk) was born at Arcade Plus, the company that made such a splash in the computer gaming world with the maze chase "Ghost Hunter." When Arcade Plus suddenly folded last year, the cream of that company's designers formed a new software house. Under the Gamestar aegis, "Night Rally"—a proposed Arcade Plus racing entry sort of like "Night Driver" (Atari/Atari VCS) with hi-res graphics—was entirely reconfigured.

The result is "Baja Buggies," the best auto-race computer game available for any existing system. Night has become day in this version, and the turbo-style racers are balloon-tired dune buggies screaming down a winding desert drag-strip. The contest is concerned primarily with position: A radar screen is displayed in the lower right of the playfield with one dot to indicate the player's position and a second to mark the current leader. As cars are passed, the gamer's car improves position.

Play is controlled not with paddle controllers, but with the joystick. The buggie will always drift if left to its own devices, so the player must monitor the left and right sway of the auto. "Baja Buggies" is a treat to watch with its clean wide-open graphics, but also a revelation to play, simulating driving (especially racing) better than some far more sophisticated controls can. Audio is a steady rumbling undertone. The scrolling mountains and clouds as well as the ribbon-like highway itself are remarkable, especially given that this wonder was squeezed into the minimum 16K to allow play on all Atari computers.

The only quibble is that when the player finally whips A.J. Cactus and company fair and square, he gets no audiovisual reward. Beating these customers is no easy task, and when the computer trumpets don't sound—well, you may feel a bit unappreciated. You will be able to engrave your nom de

game, and score can be recorded on the disk's vanity board which appears at the end of each contest.

**Astro Chase** (First Star Software/Atari computer systems/32K/disk) is from Fernando Herrera, who gained a small cult following with "Space Chase," his innovative early classic for the Atari computers. His big step forward, however, came with the program he designed for his learning-impaired son, "My First Alphabet." It won the first Atari Star Award from the company's Program Computer Exchange.

Copping that prize established Herrera as a major creative force in the Atari computer-software field. Then he joined forces with Pona Star, a small film company previously recognized primarily for *The Night the Lights Went Out in Georgia*, and they established the first video-game/moviemaking crossover firm. The company, dubbed First Star after its prized designer, will make films that involve video games, which will then be released as games—sort of like *Tron* gone all the way. The initial offering from this ambitious company is Herrera's revolutionary "Astro Chase," a state-of-the-art space shoot-out with enough challenge and audiovisual frills to occupy the skill and imagination of any gamer.

The game opens with the first of seven interludes. From the end of a futuristic city block a space ace comes strutting from the house closest to us. Parked in front is an armed flying saucer. The space soldier moves underneath his craft, throws his home planet Earth a salute, and is beamed aboard.

The scene then shifts to the ship in space. The Earth is the largest object on screen and the focal point of the game. The pilot must protect his planet from the squadrons of invading aliens that pollute this sector of space. Full 360-degree scrolling allows the defender to venture out after the enemy in any direction. In fact, using an innovation First Star has dubbed "single thrust propulsion," the ship can move in one direction, lock on course, and then fire in any direction desired—even backwards.

Don't stray too far from Earth, however; the alien ships are not nearly as deadly as the floating space mines they loose in the direction of our home planet. Should a mine hit *terra firma*, the entire planet explodes in a burst of color and motion heretofore unmatched on any home game. Save the Earth, however, and you will star in those alternate intermissions mentioned earlier. In one a limo appears, the pilot boards, and he is taken off-screen in a parade complete with both the Army and Navy.

Played to the tune of "The 1812 Overture," "Astro Chase" is indeed a blast—a revolutionary game with graphic achievements of stunning virtuosity.



# Which Home Computer Is Best for You

**Before choosing,  
know each model's  
strengths and  
weaknesses**



**by Mark Andrews**

During the early years of the personal computer era—from 1977 to 1979 or so—it was easy to go shopping for a home computer. There were Apples and Apples, and that was about it. Then other companies began introducing home computers, and deciding between makes and models started getting complicated. Shop for a home computer today and you'll find yourself comparing Apples and Ataris—to say nothing of Commodores, TRS-80s, and TI-99/4As. And more new computers than you can shake a light pen at will be on the market before the end of this year.

Apple, the company that invented the personal computer, now has a new model called the Apple IIe. Mattel, maker of the Intellivision video-game system, has unveiled a new home computer called the Aquarius system. And Atari, Mattel's biggest competitor in video games, has a brand-new home computer, the 1200XL.

New computers are available for under \$150 from Texas Instruments, Timex, and Sanyo. New computers in the \$150-to-\$500 range are being offered by Panasonic, NEC, and Spectravideo. IBM reportedly will soon unveil a \$600-to-\$750 computer for the home. In the \$1000-plus price bracket, Epson now has a new home-and-office computer that understands plain English. And other new high-end computers designed for both home and busi-

ness use are offered by manufacturers including Hewlett-Packard, Hitachi, NEC, Sanyo, and Toshiba.

The record crop of new computers brings good news and bad news. The bad news is that it is harder to figure out what kind to buy. The good news is that once you decide what kind of computer you want, you'll almost certainly find one that meets your needs. If you're not sure what your needs are, start by asking yourself two questions: (1) why do you want a home computer, and (2) how much do you want to spend on one?

## **1. Why Do You Want It?**

The many uses of home computers can be divided into three categories: education, entertainment, and utilities.

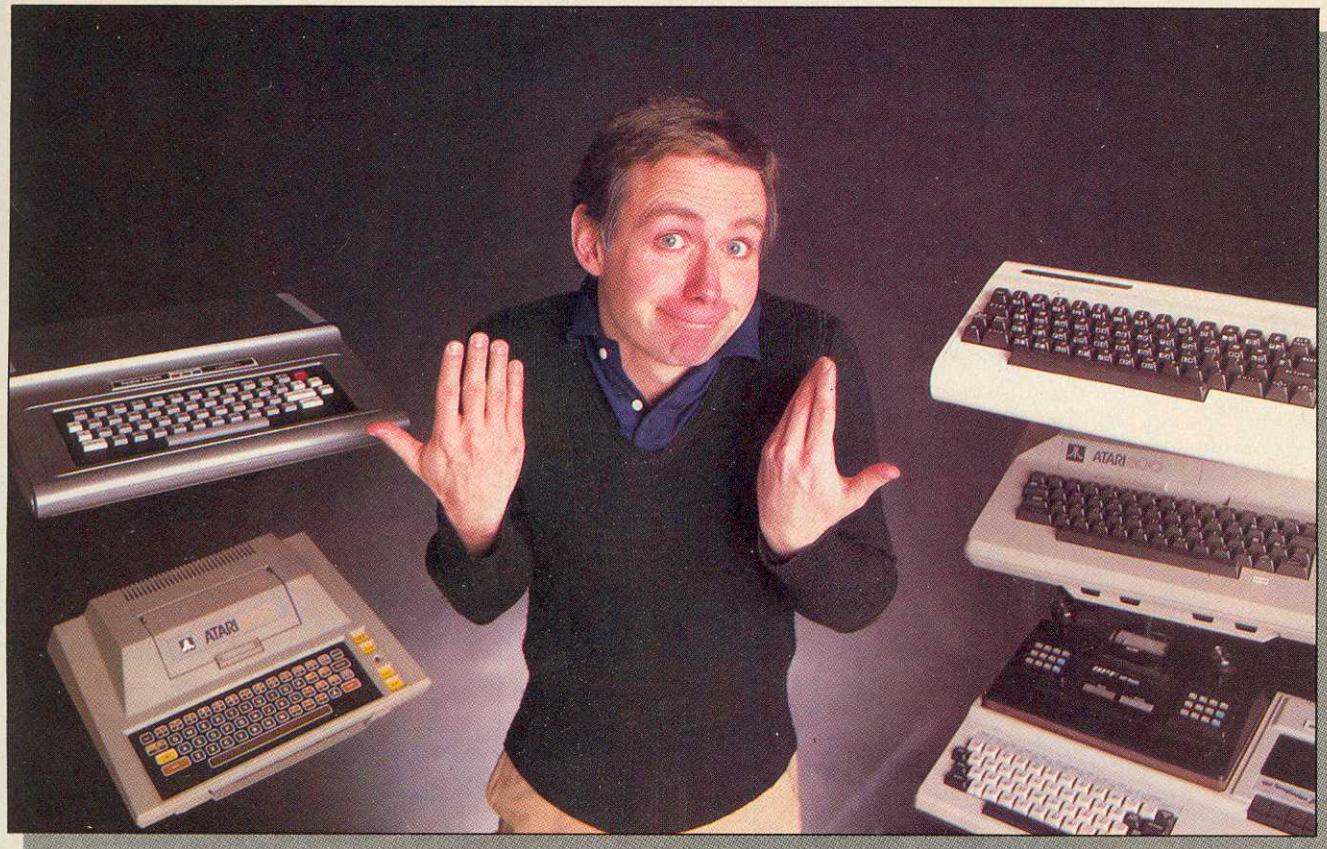
**Education.** Computers have proven useful in helping children study reading, writing, arithmetic, and other subjects. Computers also help adults study such subjects as languages, music, art, math, touch typing, and computer programming. Almost any home computer can be used for educational purposes; but if education is one of your main reasons for buying a computer, you'll want a system for which a variety of educational "software" (programming) is available.

Educational programs for home computers are available in three formats: 5-1/4-inch disk, audio-type cassette, and plug-in cartridge. Cassettes

are the medium most often chosen by educational software suppliers. To run programs recorded on cassette, you'll need a computer system that works with a cassette recorder. Some computers can be interfaced with ordinary cassette recorders; others require special cassette machines. A teaching cassette usually has both an audio track and a track for computer data. On the data track is an interactive program designed to show up—as text, graphics, or both—on the screen. As the program runs, the cassette's audio track provides aural instructions through the TV speaker.

There are two main kinds of education-oriented home computer: "learning computers," and more versatile full-size home computers. If you've never used a computer and would like to learn how one is programmed and how it works, you can do that most economically by picking out an under-\$150 computer such as the Timex/Sinclair TS-1000, the new Timex/Sinclair TS-2000, the new Texas Instruments TI-99/2, or the new Sanyo PHC-20. For more demanding educational needs, try a larger computer system with a large library of educational software.

Computers that meet that description right now include the Apple II and the new Apple IIe; Atari 400, 800, and 1200XL; Commodore VIC-20; Radio Shack TRS-80 Color Computer; and Texas Instruments 99/4A. Most manu-



facturers of new home computers have promised that big selections of educational software for their machines will be available soon. A few like Mattel and Spectravideo have already started to make good on that claim.

**Entertainment.** An entertainment-oriented computer can be used to play computer games. These units come in two types: arcade-style action games, and fantasy and adventure games. Adventure games are usually sold on 5-1/4-inch disks, so to play them you would need a computer system that works with a disk drive. Some arcade-style games are also available on disk, but others are sold on cassette. More and more action games are coming as plug-in cartridges. A game-oriented computer system should therefore include a disk drive and a cassette data recorder—along with a color TV set or color monitor, since a black-and-white screen can hardly do justice to today's colorful computer games.

Extensive game libraries are available for computers made by Apple, Atari, Commodore, IBM, Radio Shack, and Texas Instruments. Smaller but fast-growing game collections are also available for some new computers including those from Mattel, NEC, Panasonic, and Spectravideo.

**Utilities.** Computers can be used for far more than learning French and playing "Pac-Man." A well-equipped home computer can do just about any-

thing that a typewriter, calculator, or filing system can do—and usually better. But for every computer job you need a special program, and some tasks also require special accessories.

When a computer is used as a typewriter, it's called a "word processor." To turn your computer into a word processor, you will need a word-processing program, a TV (or with some systems, a special monitor), and a line printer. When you use a word processor, the letters you type into the computer's keyboard instantly appear on the screen. You can correct mistakes by moving a "cursor" spot around the screen and typing right over errors. You can easily erase or replace letters, words, even whole paragraphs without need for a correcting ribbon, bottle of white-out, or typing eraser. And once your writing job is done, you can save it on a disk and then print it out, letter-perfect, on a line printer.

A home computer can also be used for figuring taxes, balancing checkbooks, and filing recipes, addresses, and telephone numbers. With a device called a "telephone modem" you can connect a computer to many different electronic databanks. Then you can receive wire-service news, keep up with stock-market reports, or play bridge with a friend in Tennessee and a couple of strangers in Nebraska.

Every home computer on the market today has some utility programs in its

software catalog. But some computers are better than others at handling serious programs. High-quality computers designed primarily for utilitarian purposes are made by many companies including Apple, Epson, Hewlett-Packard, Hitachi, IBM, NEC, Sanyo, and Toshiba.

## 2. The Price You Pay

Now for the second question we asked some time ago: how much should you pay for a home computer? Generally speaking, "learning computers" carry list prices of less than \$150. Prices of full-size home computers designed for education, entertainment, and some utilities run from about \$150 to just under \$1000. And business-oriented personal computers start at around \$1000. Accessories and software usually cost extra and can push the price of a complete computer system up to more than 10 times the price of a basic unit.

## Your First Computer

Last October Timex introduced the world's first under-\$100 computer: the TS-1000, priced at a suggested \$99.95. Now both Texas Instruments and Sanyo offer computers for less than \$100.

TI's no-frills TI-99/2 is small enough to slip into a briefcase and can be used with software stored on cassettes or

Mark Andrews is a contributing editor of VIDEO.

# Charting Popular Personal Computers and New Models

plug-in cartridges. The unit has moving keys, but they don't have a typewriter-like feel; they are flat on top and therefore are not ideal for high-speed programming or such jobs as word processing. The TI-99/2, listing at \$99.95, has a 4.2K (4000-plus characters) of RAM (random access memory). So the TI-99/2 can store about 800 words of text in memory or run computer programs about 800 words and numbers long. That means that short programs—nothing fancy—can be written and run on the TI-99/2. Texas Instruments designed the TI-99/2 to appeal to computer novices, students, engineers, and computer enthusiasts who already own a full-size home computer such as the TI-99/4A.

Sanyo's bare-bones computer, the \$99 PHC-20, is similar to the TI-99/2. The PHC-20 has 5K of memory, expandable to 16K with an optional plug-in board. And programs written on the PHC-20 can be stored on cassettes using a standard audio-cassette recorder.

Timex, which has achieved great success with its \$99.95 TS-1000 computer, now has a newer and more powerful model, the TS-2000. The TS-2000 is not much bigger than its kid brother but has moveable keys, up to 48K of memory (the same capacity as an Atari 800), and color-display capabilities. Its list price is \$149 to \$199, depending on the amount of memory installed.

## The Age of Aquarius

Mattel is aiming at the under-\$200 buyer with its Aquarius System, a mid-sized color unit that is designed to grow with the user. The Aquarius has a smallish (9-by-13-inch) keyboard with 49 moving keys. The unit's many matching accessories include a smaller printer, cassette data recorder, and game and expansion module equipped with a pair of Intellivision-style game controllers.

"A consumer can purchase the basic Aquarius unit without buying any other peripheral attachments," an executive at Mattel explained. "As the new computer owner becomes more familiar with the basic Aquarius unit, he or she can then decide to add other peripherals to the system. We believe that the Aquarius console and add-ons

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Manufacturer	Model	Price	Memory	Uses*	Keyboard	Software Selection
Apple	Lisa	\$9995**	1000K	Ut	Fast	Growing
Apple	IIe	\$1395	64-128K	Ut/En/Ed	Fast	Huge
Atari	400	under \$300	16K	En/Ed	Slow	Excellent
Atari	800	under \$800	48K	Ut/En/Ed	Fast	Excellent
Atari	1200XL	\$895	64K	Ut/En/Ed	Fast	Excellent
Commodore	VIC-20	under \$200	5-32K	En/Ed	Fast	Very Good
Commodore	64	\$595	64K	Ut/En/Ed	Fast	Good
Epson	HX-20***	\$795	5-32K	Ut	Fast	Limited
Epson	QX-10	under \$3000**	64-256K	Ut	Fast	Good
Hewlett-Packard	HP-86	under \$2000	64-576K	Ut	Fast	Good
IBM	PC	\$1595**	16-524K	Ut/En/Ed	Fast	Large
IBM	"Peanut"	—	—	Ut/En/Ed	—	High Hopes
Mattel	Aquarius	under \$200	4-52K	En/Ed	Slow	Growing
NEC	PC-6001A	\$349	15-32K	Ut/En/Ed	Fast	Growing
Panasonic	JR-200	\$350	32K	En/Ed	Slow	New
Radio Shack	TRS-80 Model III	\$699**	4-48K	Ut/En/Ed	Fast	Excellent
Radio Shack	TRS-80 Color	\$399	4-32K	En/Ed	Slow	Good
Sanyo	PHC-20	\$99	5-32K	Ut/En/Ed	Slow	New
Sanyo	MBC-1000	\$2000	64K	Ut	Fast	Good
Spectra-Video	SV-318	\$300	32-144K	En/Ed	Slow	Growing
Texas Instruments	TI-99/2	under \$100	4-36K	Ut/En/Ed	Slow	Growing
Texas Instruments	TI-99/4A	under \$300	16-48K	Ut/En/Ed	Fast	Excellent
Timex-Sinclair	TS-1000	under \$100	2-16K	Ut/En/Ed	Slow	Good
Timex-Sinclair	TS-2000	\$150	16-48K	Ut/En/Ed	Slow	Growing
Toshiba	T-100	\$795	64K	Ut/En/Ed	Fast	Good

### Notes

\*Uses: Ut = Utility; En = Entertainment; Ed = Education.

\*\*Price includes full system.

\*\*\*Portable computer with full-size keyboard plus built-in cassette drive with mini-printer.

# Home Computers

*continued from page 48*

should be available at retail for around \$500."

The Aquarius appears to be an excellent computer system for beginners. It is not a heavy-duty utility system, however, and is not intended to be one. Its keyboard is not ideal for touch typing, and its printer not adequate for word processing or business-style printing. But education and entertainment are a different story. Mattel introduced a comprehensive selection of software for the system. And if Mattel is as enthusiastic about Aquarius as it seems to be, an extensive library should be available by the end of the year.

New color computers in the \$150-to-\$1000 bracket are now being offered by NEC, Panasonic, and Spectravideo.

NEC's first home computer, the PC-6001A, is a 16K unit (expandable to 32K) listing at \$350. Accessories include a cassette data recorder, disk drive, 80-column line printer, and \$200 touchpad that can be used to display drawings on a color TV screen. The PC-6001A has typewriter-style fingertip-shaped keys that can be comfortably used by touch typists for jobs such as word processing. And NEC has already started rolling out a large library of educational, utility, and entertainment programs including many games already popular among owners of other computers. So the PC-6001A, though new in this country, appears to be shaping up as a versatile multipurpose computer.

Panasonic's new JR-200 also carries a list price of \$350. It has 32K of RAM and comes with the BASIC programming language built in. The JR-200 can run and store programs recorded on any cassette recorder, but can also be used with a special \$90 recorder that will load and save data at four times the speed of an audio-cassette machine. The JR-200 is powerful, easy to operate, and fun to use. It has a full-size typewriter keyboard with moving keys, and color graphics can be entered from the keyboard. But the JR-200's keys have a flat-topped design that makes touch typing difficult, so the unit would probably not be ideal for jobs such as high-speed data entry or word proces-

sing. Panasonic has promised a large selection of programs for the JR-200 in months ahead, and several major software suppliers have already started producing Panasonic-compatible utility programs and games.

One unusual new computer is the Spectravideo SV-318, which has a built-in joystick mounted on the keyboard. The SV-318 comes with 32K of RAM, expandable to 144K. Extended Microsoft BASIC is built in, and Spectravideo says the computer is compatible with the CP/M software library—the largest collection of computer software available. Unfortunately, the Spectravideo SV-318, like the Panasonic JR-200, has flat-topped keys that a touch typist would probably not appreciate. The suggested retail price: \$299.95. As this article is being written, four utility programs and 16 games for the SV-318 had been introduced and demonstrated by Spectravideo. But by June, the company says, 100 programs will be available.

### The New Atari

Atari's newest computer, the 1200XL, has a suggested list price of \$899. It is a sleek and handsome 64K machine with a built-in self-diagnostic system, built-in European character set, and 12 user-programmable function keys. The 1200XL is compatible with all software and accessories designed for Atari's 400 and the 800. Its expanded memory, along with its extra function keys, also enable it to run more complex programs than Atari's other two computers can.

The 1200XL, like the 800, has a full typewriter keyboard with comfortable typewriter-style moving keys. But one defect of the Atari 800 keyboard, an inverse video key where the right-hand shift key should be, has been eliminated on the 1200XL. And the keys used to move the 1200XL's screen cursor are easier to operate than the cursor keys on the Atari 800.

For some reason, though, some of the 800's useful features have been left out in the design of the 1200XL. The number of joystick ports has been reduced from four to two, for example, and the number of cartridge slots has also been halved—from two to one. In addition the 1200XL is a sealed console without the lift-off top and the plug-in circuit boards that make the 800 so easy to modify. When you buy a 1200XL, what you see is what you get: 64K memory and 40-column screen display. And that configuration appears difficult to change without tearing the computer apart and voiding its warranty. So if you want an Atari that you can soup up—by adding more memory or an 80-column display, for instance—then get an 800 while you can.

Utility-oriented computers in the

over-\$1000 bracket have been introduced over the past few months by manufacturers including Apple, Epson, Hewlett-Packard, Hitachi, Sanyo, and Toshiba.

Epson has two new computers: the bookcase-size HX-20, which retails for a suggested \$795, and the full-size QX-10, which is specifically designed to be used by computer novices. The QX-10 has a set of special keys with labels like Print, Store, and even Help. The Help key is designed to give the user full instructions for any job he or she wants to do—in plain English. "If you can use a typewriter, you can use this computer," says Epson Vice President Jack Whalen. "It's the first computer for which no training is necessary." The QX-10 comes in a package that includes a word processor, disk drive, and 64K of RAM (expandable to 256K). A complete QX-10 system retails for less than \$3000—not a small amount, but less than you'd have to pay for most similarly equipped systems. And enough software is available for the QX-10 to fulfill virtually any home or office need.

### Them Apples

Apple's newest computer, the Model IIe ("e" for enhanced), is the latest edition of the Apple II. "There have been 13 revisions to the Apple II's basic design since it was introduced in 1977," Apple said in introducing the new unit, "but none has been as extensive as the Apple IIe."

The Apple IIe has 64K of RAM, expandable to 128K, and a list price of \$1395. It has upper- and lower-case characters available in several different language fonts and is compatible with the same vast library of software written for the Apple II. In addition, more than 20 software packages written especially for the IIe have been released by Apple and independent software manufacturers. Much more IIe software is certain to follow. The new Apple IIe, like its famous predecessor, can handle just about any microcomputer task. Given the proper software and accessories, educational, entertainment, and utility programs can all be run on the Apple IIe.

Shortly after Apple introduced its new computer, the *Wall Street Journal* reported that another giant computer manufacturer, IBM, would soon be unveiling a new home computer called the Peanut. The *Journal* said that the Peanut would make its debut within the next six months or so at around \$600 to \$750.

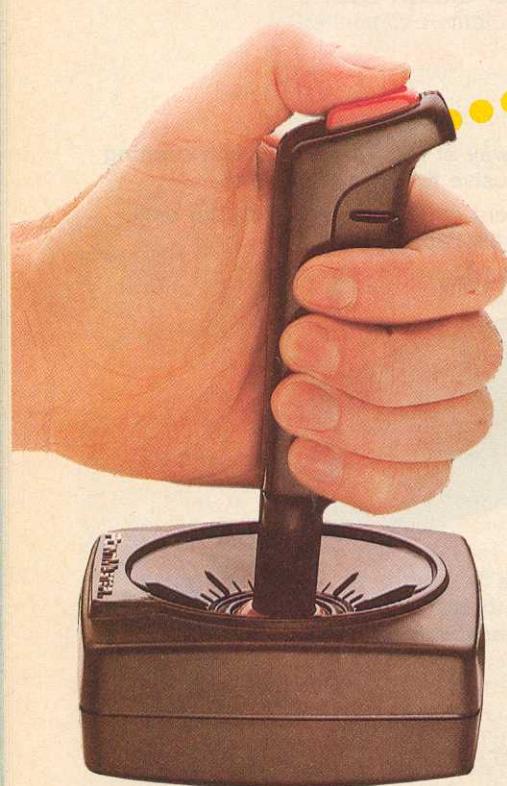
A spokeswoman for IBM, asked about the *Journal* report, replied: "That was purely speculation by the *Wall Street Journal*. We never comment on future introductions."







**The unusual triangular steering handle of Zircon's Video Command stick (above) may take getting used to; Dishwasher's Pointmaster (below) is handsome but sluggish.**



Tired of nursing your throbbing thumb after several rounds of *Space Invaders*? Is that old controller of yours barely hanging on with toothpicks and glue? Do you ever find yourself wishing for a way to double your scores overnight, and add more life to your video game? If these questions have been keeping you up on lonely nights, we've got the answer for you: you need a new joystick.

Comparing all the world's home video-game joysticks is tough. It's even worse than comparing apples and oranges—it's more like apples to oranges to pears to pistachios to wild hickory nuts. Like people, they come in all shapes, sizes, colors, and attitudes. There's at least one for every taste and budget from \$10.95 to \$99.95.

All the joysticks and game controllers we evaluated for this report are designed to be used with the venerable Atari VCS, officially known as the CX-2600. Of course they're also compatible with equivalent machines like Sears'

Video Arcade—as well as several other computers and games that use the same standard nine-pin jack for the joystick port, like the Atari 400 and 800, Commodore VIC-20, and Ultimax computers.

Coleco's ColecoVision system uses the same joystick jacks as Atari-type consoles, but has some idiosyncrasies. Some Coleco games like "Cosmic Avenger" and "Mousetrap" require either an extra firing button or the ColecoVision keypad, neither of which is available on most Atari-compatible joysticks. You can get around at least the keypad problem by using a nine-pin "Y" adapter to connect both the ColecoVision controller and a standard joystick. KY Enterprises, Questar, Wico, and several other firms have Coleco-compatible controllers with extra firing buttons in the works, and these should be on dealers' shelves later this year.

Game controllers fall into two basic types: joysticks and consoles. All the others fall into a "special" category encompassing everything from trackballs to keypads, along with accessories designed to help improve the performance of the stick you already have, like rapid-fire modules.

### Joysticks from the Bottom Up

The first joystick made for the Atari VCS was the one, the only, the original: the CX-40, a plain, small, red and black

plastic stick that Atari provides with every VCS. It's a decent joystick with a firm snappy feel that belies its extremely low cost—\$10.95 a pair, by far the lowest price of any joystick in our survey. The Atari joystick has a stiff mechanism that responds quickly to a minimum of movement, a feature to which most diehard Atari gamers are so accustomed that even trying to get them to use a new stick is like pulling teeth from a hippo in heat. Still, if you give the other controllers a chance, you may find yourself scoring higher and enjoying your games more than ever.

Atari also offers specialized controllers for use with specific games, like the CX-21 Keypad (for "Star Raiders"), the CX-30-04 Paddles (mainly for "Breakout"), and the CX-20-01 Driving Controllers (for "Indy 500"). Since these

accessory controllers can't be used with all cartridges, their use is somewhat limited unless you spend a lot of time playing these particular games.

Next up in price is Suncom's Slik Stick and Star Fighter, which sell for \$10.95 and \$16.95. Both are about the same size, sporting a short squat black-plastic base about 3-1/2 inches square. The Slik Stick features a two-inch handle with a small red ball on top, imitating the style if not the solid feel of a classy arcade controller. Suncom's Star Fighter, touted as "the ultimate joystick," deletes the red ball and fattens up the stick by about half an inch. Their small size make these joysticks good choices for younger children. Their tight stiff action makes them great for fast turns and quick moves, though their tiny 3/8-inch firing button makes rapid-fire shooting tougher for large hands.

### Sleek and Cheap

Spectravision's Quick-Shot is a sleek all-black joystick featuring a contoured handgrip for comfortable firing and positioning. The "Quick-Shot" is one of the more unusual sticks we evaluated since it features both a top- and a side-mounted firing button which can be used in tandem for super-rapid firing. Four rubber feet on the bottom provide a firm base for using the stick on a tabletop, though it's a little bulky to hand-hold comfortably. We found the steering a little oversensitive, but liked the joystick's large five-inch handle, which should be perfect for both teens

*Marc and Robert Wielage are dedicated videophiles and avid video-game players.*

# GETTING A GRIP ON

## JOYSTICKS

Serious video gamers  
won't settle for less than complete control

by Marc & Robert Wielage

and adults. At \$13.95 we'd rate the Quick-Shot a best buy.

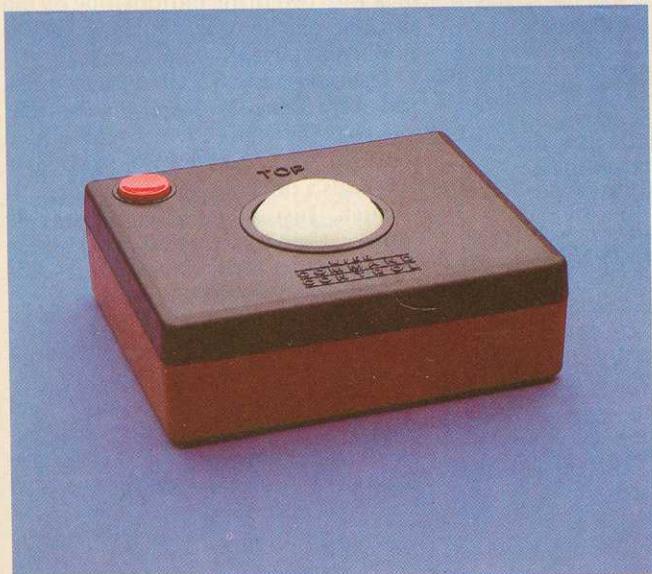
For a dollar more you can get Zircon International's Video Command joysticks, originally developed for Fairchild's old "Channel F" game system about five years ago. Model J-3201 features a unique one-handed triangular steering control that moves in all eight directions for steering and pushes down for firing. We found this feature uncomfortable and unwieldy, requiring more patience than either of us could muster. Apparently the people at Zircon agreed with our opinion (shared by other gamers) and recently upgraded their old joystick to the new

J-3022, which adds a small red trigger button, at one side of the handgrip, which you fire with your index finger. This button changes the Zircon from dud to dazzler, though its triangular steering handle still makes it a little tricky to get oriented. We'd rate the Zircon tops for space-battle games, but only so-so for maze games which require precise steering.

Moving up on the price ladder we come to Discwasher's Pointmaster, a handsome red-and-black stick with a long five-inch handle and top-mounted firing button. We enjoyed the Pointmaster's light weight and attractive design, but felt it wasn't sensitive

enough and lacked a much-needed firm, solid feel. We nearly broke it in a series of fast turns in "Pac-Man" due to its overall sluggishness, and it felt flimsy compared to other products in its price range. On the other hand, the Pointmaster is possibly the most widely available joystick in our survey, selling for \$16.95 at most large department and record stores. Overall we'd rate it fair for both durability and response. Discwasher recently came out with an upgraded model, the PointMaster Pro, which adds automatic rapid-firing and sells for \$27.95.

Newport Controls Prostick II is next on the list. This \$24.95 joystick comes



Wico's Trackball: a good one for 'Missile Command.'



The standard Wico: tops for durability and response.

# Charting Joystick/Controllers

MANUFACTURER/ADDRESS	MODEL	PRICE	FEATURES/COMMENTS
<b>Atari</b> 1265 Borregas Ave. Sunnyvale, Calif. 94086	CX-40 Joystick	\$10.95/pair	original eqpt.
	CX-50 Keyboard Controller	\$21.95	for "Star Raiders"
	CX-30-04 Paddles	\$21.95/pair	for "Breakout"
	CX-20-01 Driving Controllers	\$21.95/pair	for "Indy 500"
<b>BC-Systems</b> 59 W. Wyoming Ave. Melrose, Mass. 02176	BC-Blaster	\$29.95	5-button console; 8½" x 5" x 2"
<b>C&amp;T Creations</b> 127 Weybosset St. Providence, R.I. 02903	Skill-Stik	\$5.99	add-on adhesive stick for Coleco or Intellivision
<b>Cynex Mfg. Corp.</b> 28 Sager Pl. Hillside, N.Y. 10534	Game Mate II	\$99.95/pair	wireless remote-control joystick
<b>Darbre Products</b> Box 154 Lyons, Ill. 60534	The Ball	\$3.95	add-on grip for standard VCS joystick
<b>Datasoft</b> 16606 Schoenborn St. Sepulveda, Calif. 91343	LeStick	\$39.95	unique mercury-switch handle
<b>Discwasher</b> 1407 N. Providence Rd. Columbia, Md. 65205	Pointmaster	\$16.95	top-mounted firing button
<b>D-Zyne Video Products</b> 64 Dayton Rd. Waterford, Conn. 06385	Supr-Stick	\$39.95	
<b>Games, Inc.</b> 6626A Valjean Ave. Van Nuys, Calif. 91406	Apex Super Joystick	\$29.95	
<b>Irra Repairs</b> 2562 E. Glade Mesa, Ariz. 85204	repair parts		joystick parts and accessories for Atari
<b>KY Enterprises</b> 195 Claremont #288 Long Beach, Calif. 90803	Fingertip Controller	\$19.95	cluster-type controller; also avail. w/2 firing buttons for Coleco
<b>Laskey Video Dist.</b> 20 Morning Dove Irvine, Calif. 92714	Injoy-A-Stick	\$10.95/pair	add-on drop-in stick for Intellivision
<b>Questar Industries</b> 670 N.W. Penn Ave. Chehalis, Wash. 98532	Questar I	\$34.95	button console w/rapid-fire
	Questar II	\$39.95	joystick console w/rapid-fire
<b>Screenonics</b> Box 8892 St. Louis, Mo. 63102	extension cords, monograms, etc.		joystick accessories
<b>Spectravision</b> 39 W. 37th St. New York, N.Y. 10018	Quick Shot (#318-101)	\$13.95	left and top firing buttons
<b>Starplex Electronics</b> E. 23301 Mission Liberty Lake, Wash. 99019	Starplex Controller	\$29.95	5-button console; rapid-fire mode
<b>Suncom Products</b> 270 Holbrook Drive Wheeling, Ill. 60090	Slick Stick	\$9.95	
	Starfighter	\$16.95	deluxe version of above
<b>Wico Consumer Division</b> 6400 W. Gross Pt. Rd. Niles, Ill. 60648	15-9714 Joystick	\$29.95	ball handle
	15-9730 Red Ball	\$34.95	larger base
	15-9708 Deluxe	\$39.95	arcade-style
	72-4545 Trackball	\$69.95	trackball
<b>Zircon International</b> 475 Vandell Way Campbell, Wash. 95008	J-3201	\$14.95	unique handle grip; pushes down for firing

in an extremely strong plastic case that would probably withstand even an elephant's tapdance. We found its contoured case comfortable, though our index fingers grew a little weary with the center-mounted firing button. Newport also plans to offer an updated model with two firing buttons for the ColecoVision, along with other exciting designs not finalized at presstime.

Games' Apex Super Joy Stick (also made by Newport Controllers) is one of the larger sticks we evaluated. This \$29.95 unit sports a four-inch metal stick with a comfortable black-ball handlegrip, built into a sturdy metal "mansized" case. This joystick had an extremely precise steering range, making it tops for maze games, though its firing button takes a little getting used to. Otherwise we found Games' joystick excellent overall—perfect for the older gamer, less so for young children who might have a tough time figuring out how to hang on to the large base.

Also in the \$30 range is Coin Controls' Competition Pro joystick, an unusually styled black and red model that features twin left and right firing buttons—a relief for lefties the world over. While we liked the smooth feel of the Coin Controls joystick, its firing action left a bit to be desired: We found it difficult to hand-hold and fire at the same time. We did find it more comfortable on a tabletop, using our index fingers instead of thumbs for firing.

## Wico Sets the Standard

In the upper strata we reach the *ne plus ultra* of game controllers: Wico's extensive line. Widely known for their arcade products, Wico has formed a consumer division for the burgeoning home market and offers several separate Command Control joysticks in the \$29.95 to \$44.95 range. The original model 15-9714 features a four-inch stick with two firing buttons, one on top and one on the base, which are selectable using a small black switch.

The model 15-9730 Red Ball joystick adds a 1-1/2-inch ball grip and shortens the stick by half an inch for added comfort. The model 15-9708 Deluxe unit adds a thicker base to the standard joystick. Just released is the \$36.95 "Power Grip" model 50-2020 which features a comfortable arcade-style handle that fits your hand like a glove, and a deluxe model 50-2010 which gives you three interchangeable grips for the ultimate in flexibility.

For styling, durability, comfort, and response, all Wico sticks set the standard for the industry. These are among the few joysticks we evaluated that felt like they'd probably withstand practically any abuse up to and possibly including a thermonuclear bomb. Each did a great job with all the games used for testing, with fast, precise position-

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# Joysticks

continued from page 60

ing and a fantastic feel. Wico's arcade experience has paid off.

We leaned towards Wico's Red Ball stick for most games, though some may prefer the standard or Deluxe models; the latter's wide base might make it preferable for hand-holding by some. We didn't have a chance to evaluate the

new "multi-grip" units at press time, but they would be excellent choices for the experienced gamer for whom price is no object.

D-Zyne's Supr-Stick (*sic*) is a little more clumsy than Wico's, though it is in the same \$39.95 range. This model features a two-inch black-handled stick with a top-mounted firing button positioned for use by either left or right-handers. The heavy weight of the 6-1/2 by 3 by 2-inch cabinet makes the Supr-Stick a little tough to get used to; ditto the joystick itself, which makes internal clicks and clacks when moved as if a live grasshopper were inside. While we can appreciate the dual left/right-hand firing button, we found it uncomfortable, but not impossible to get accustomed to. Other than that the Supr-Stick had excellent response and a good hefty feel, though not quite up to the Wicos.

## A Naked Joystick

Also selling for \$39.95 is Datasoft's LeStick, perhaps the most unique controller we've seen. What you get is a naked joystick with an invisible "phantom base," with your position determined by a series of sensitive internal mercury switches. Sad to say, we found LeStick more innovative than useful and had a tough time steering through complicated maneuvers or mazes. Even keeping your ship perfectly still is difficult—you must hold the stick exactly perpendicular to the floor. LeStick is an interesting achievement, but at \$39.95 you can do better with most other controllers in our survey.

The last on our list of standard joysticks is also the most costly: Cynex's Game-Mate 2, which at \$99.95 costs nearly as much as the VCS itself. The Game-Mate 2 has a unique ability: it allows you to play up to 20 feet away from your game console *without wires*—a blessing to those who have stumbled over the rat's nest of cables that often clutters gamers' households. Game-Mate joysticks are essentially identical to those provided with the Atari, but with a large three-inch plastic base and attached six-inch rubberized antenna. These joysticks use an internal nine-volt battery to transmit signals to the Game-Mate receiver, which in turn plugs into the Atari VCS with four easily attached cables.

So far, so good. Unfortunately, Game Mate 2 works better with some games than others. For "Pac-Man" its slow response and reluctance to move our man downward made maze travel difficult. Once you steer it in a particular direction, it's hard to get it to stop or slow down. Also, since the Game-Mate uses the same basic joystick as the standard Atari model, it wasn't as comfortable as some of the better stand-alone joysticks we evaluated. It would've been



nice if the manufacturer had provided the means to attach other joysticks to the transmitter, but then you'd wind up with the same wiring problems. We worry about battery life, too, since the Game-Mate joysticks don't have a light to indicate when they're left on. Lastly, the sample we evaluated had a small defect—the right joystick occasionally fired by itself when the stick alone was manipulated. Unless you're a remote-control nut, we think a \$10 extension cord (available from D-Zyne, K-Y Enterprises, Wico, and others) is a much better buy.

### Alternatives to the Stick

Several top arcade games—"Asteroids," "Space Wars," "Star Castle"—don't use joysticks at all. Instead they give you four or five spring-mounted pushbuttons that essentially duplicate the action of a joystick, and in some cases provide better and faster response. Like their big brothers, home-style console controllers use spring-mounted buttons for direction, speed, and firing and are designed to be used on a tabletop or lap.

At this writing, five home game consoles are on the market: the Transcriber Co.'s Faster Blaster, KY Enterprises' Fingertip Controller, BC Systems' BC Blaster, the Questar I from Questar Industries, and Starplex Electronics' Starplex Controller. Questar also offers a hybrid joystick/button console, the Questar II.

Transcriber's Faster Blaster is the flattest and tiniest console we've ever seen, a palm-sized unit about 4-1/2 inches long by 3-1/2 wide, and a mere 5/8-inch thick. It uses five light-touch membrane switches, each color-coded for a specific function: shield/down, thrust/up, left, right, and fire/replay. How does the Faster Blaster stack up against the other control consoles? Well, the good news is that it's the cheapest console on our list, selling for under \$15. Another plus is that it'll last virtually forever by virtue of its long-life membrane switches. The bad news is that we found these switches extremely sluggish, with a slow-reacting firing button. We also had a tough time hand-holding the unit, which must be operated with both hands during rapid-action games.

KY Enterprises' Fingertip Controller is unique in that it uses a distinctive "clustered" design, keeping all four directional buttons in a diamond-shaped group for rapid one-handed steering, with the red firing button at the top left. KY's controller beat out all the others for sheer speed and reaction time, with its light-touch buttons offering an excellent springy feel. The manufacturer offers both a standard VCS-type version and one designed especially for the ColecoVision, which

uses two firing buttons for games like "Cosmic Avenger." For \$19.95 (\$22.95 for the Coleco model), we'd rate KY's controller a best buy in the console category.

The BC-Blaster, Questar I, and Starplex Controller are all essentially identical, selling for between \$30 and \$40, with two buttons on the left side for steering left and right, two buttons on the right for up (or thrust) and firing, and a single button in the middle for down (or hyperspace, for "Asteroids"). By adding an AA battery to the Starplex, however, you get the added

bonus of Astro-Blast—automatic rapid fire, a real plus for action-packed games like "Asteroids." While we felt all three consoles were nearly the same in feel and fast response, we'd give the edge to the \$36.95 Questar I by virtue of its sleek cabinet, which seemed a little sturdier than the others.

For those who like the feel of a joystick with a console's arcade styling, the Questar II joystick console is a perfect choice at around \$40. It's large enough to comfortably fit on a lap or a tabletop, and its joystick was comparable to most of the better ones we evalu-

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ever. While nobody has yet managed to create the perfect controller, you can bet that as more games are sold, more "cottage industries" will spring up to support any and all new units.

What's in the future for game controllers? At a recent trade show, Atari finally took the wraps off a variety of new joysticks for expert gamers, casual players, even toddlers—all due out later this year. Coleco is in the process of taking the standard joystick to new heights with a new Super-Action Controller that sports four distinct firing buttons and a unique handgrip that covers your hand like a glove. Best of all, future versions of this controller will feature electronic feedback circuits designed to let you feel the hard "thwack" of a home run during a baseball game or the "whomp" of a round-house punch in boxing.

We'll be covering these and many other developments in upcoming issues.

